



**US Army Corps
of Engineers**
Galveston District

GALVESTON HARBOR AND CHANNEL, TEXAS

SITE MANAGEMENT PLAN
FOR THE MAINTENANCE DREDGING
OCEAN DREDGED MATERIAL DISPOSAL SITE

AS REQUIRED BY
SECTION 102 OF THE
MARINE PROTECTION, RESEARCH AND SANCTUARIES ACT

SITE MANAGEMENT PLAN

GALVESTON HARBOR AND CHANNEL, TEXAS OCEAN DREDGED MATERIAL DISPOSAL SITE

I. General

The Marine Protection, Research and Sanctuaries Act (MPRSA) of 1972 (33 U.S.C. Section 1401, et seq.) is the legislative authority regulating the disposal of dredged material into ocean waters, including the territorial sea. The transportation of dredged material for the purpose of placement into ocean waters is permitted by the Corps of Engineers or, in the case of Federal projects, authorized for disposal under MPRSA Section 103(e), applying environmental criteria established by the Environmental Protection Agency in the Ocean Dumping Regulations (40 CFR Parts 220-229).

Section 102(c) of the MPRSA and 40 CFR 228.4(e)(1) authorize the Environmental Protection Agency (EPA) to designate ocean dredged material disposal sites (ODMDS) in accordance with requirements at 40 CFR 228.5 and 228.6. Section 103(b) of MPRSA requires that the Corps of Engineers (USACE) use dredged material sites designated by EPA to the maximum extent feasible. Where use of an EPA-designated site is not feasible, the USACE may, with concurrence of EPA, select an alternative site in accordance with MPRSA 103(b).

Section 228.3 of the Ocean Dumping Regulations established disposal site management responsibilities; however, the Water Resources Development Act of 1992 (WRDA 92; Public Law 102-580) included a number of amendments to the MPRSA specific to ODMDS management. Section 102(c) of MPRSA as amended by Section 506 of WRDA 92 provides that:

1. Site management plans shall be developed for each ODMDS designated pursuant to Section 102(c) of MPRSA.
2. After January 1, 1995, no ODMDS shall receive a final designation unless a site management plan has been developed.
3. For ODMDSs that received a final designation prior to January 1, 1995, site management plans shall be developed as expeditiously as practicable, but no later than January 1, 1997, giving priority to sites with the greatest potential impact on the environment.

4. Beginning on January 1, 1997, no permit or authorization for dumping shall be issued for a site unless it has received a final designation pursuant to Section 102(c) MPRSA or it is an alternate site selected by the USACE under Section 103(b) of MPRSA.

This site management plan, for the Galveston Harbor and Channel, TX Ocean Dredged Material Disposal Site, was developed jointly by the U.S. Environmental Protection Agency, Region 6 (EPA, Region 6) and the U.S. Army Corps of Engineers, Galveston District (USACE-SWG). In accordance with Section 102(c)(3) of the MPRSA, as amended by WRDA 92, the plan includes the following:

1. A baseline assessment of conditions at the site;
2. A program for monitoring the site;
3. Special management conditions or practices to be implemented at the site that are necessary for protection of the environment;
4. Consideration of the quantity of dredged material to be discharged at the site, and the presence, nature, and bioavailability of the contaminants in the material;
5. Consideration of the anticipated use of the site over the long term, including the anticipated closure date for the site, if applicable, and any need for management of the site after the closure;
6. A schedule for review and revision of the plan.

II. Site Management Objectives

The purpose of ODMDS management is to ensure that placement activities do not unreasonably degrade the marine environment or interfere with other beneficial uses (e.g., navigation) of the ocean. The specific objectives of management of the Galveston Harbor and Channel, TX Ocean Dredged Material Disposal Site for maintenance material are as follows:

1. Ocean discharge of only that dredged material that satisfies the criteria set forth in 40 CFR Part 227 Subparts B, C, D, E, and G and Part 228.4(e) and is suitable for unrestricted placement at the ODMDS;

2. Avoidance of excessive mounding either within the site boundaries or in areas adjacent to the site, as a direct result of placement operations.

These objectives will be achieved through the following measures:

1. Regulation and administration of ocean dumping permits;
2. Development and maintenance of a site monitoring program;
3. Evaluation of permit compliance and monitoring results.

III. Roles and Responsibilities

In accordance with Section 102 (c) of the MPRSA and with the Regional MOU between USACE-SWG and EPA, Region 6 on Management of ODMDSs signed August 13, 1993, EPA is responsible for designation of ODMDSs. Where use of an EPA-designated site is not feasible, the USACE-SWG may, with concurrence with EPA, Region 6 select an alternative site in accordance with Section 103(b) of the MPRSA as amended by Section 506 of WRDA 1992.

Development of Site Management Plans for ODMDSs within the Galveston District is the joint responsibility of EPA, Region 6 and the USACE-SWG. Both agencies are responsible for assuring that all components of the Site Management Plans are implementable, practical, and applicable to site management decision-making.

IV. Funding

Physical, chemical, and biological effects-based testing of dredged material prior to placement at the ODMDS shall be undertaken and funded by the permittee if the project is permitted or USACE-SWG for Federal projects. The permittee or USACE-SWG, as appropriate, shall also be responsible for costs associated with placement site hydrographic monitoring. Should monitoring indicate that additional studies and/or tests are needed at the ODMDSs, the cost for such work would be shared by the permittee or USACE-SWG and EPA, Region 6. Physical, chemical, and biological effects-based testing at the ODMDS, or in the site environs after discharge, that is not required as a result of hydrographic monitoring, shall be funded by EPA, Region 6. Funding of all aspects of this site management plan is subject to Congressional budget constraints.

V Baseline Assessment

A. Site Characterization. The Galveston Harbor and Channel ODMDS is located approximately 3.7 nautical miles offshore, and 1.3 to 1.9 nautical miles southwest of the centerline of the Entrance Channel. The site is trapezoidal in shape with vertex coordinates located at:

29E18'00"N, 94E39'30"W;
29E15'54"N, 94E37'06"W;
29E14'24"N, 94E38'42"W;
29E16'54"N, 94E41'30"W.

This site occupies an area of approximately 6.6 square nautical miles, with depths ranging from 10 to 15.5 meters. The sediment reference area is located northeast of the channel with vertices at the following coordinates:

29E20'22"N, 94E37'11"W;
29E19'32"N, 94E36'56"W;
29E19'23"N, 94E37'06"W;
29E20'13"N, 94E37'21"W.

Baseline conditions at the Galveston Harbor and Channel ODMDS were assessed during the site designation process. Details of baseline conditions, including descriptions of the marine environment in the site vicinity and the physical, chemical and biological characteristics of the sediments and the water column at the site, are contained in the Final Environmental Impact Statement (EIS) for the Galveston, Texas Dredged Material Disposal Site Designation prepared by EPA, Criteria and Standards Division, in December 1982. In 1995, EPA collected and characterized sediment and biological samples at the Galveston Harbor and Channel ODMDS. This information updates the EIS baseline conditions at the disposal site.

B. Historical Use of the Site. The Galveston Harbor and Channel ODMDS received final designation on August 31, 1984 (49 FR 171). The present configuration of this site was established in 1973. It received interim designation in 1977 (42 FR 7), and was historically used for placement of dredged material throughout this period. Historically, the dredging frequency for this navigation project is approximately 1.5 years, with an average of about 2,055,700 cubic yards (CY) of material excavated per dredging contract. A description of dredged volumes from 1965 through 2006 is depicted in the following table:

Maintenance Dredging History

START	COMPLETED	QUANTITY DREDGED (CUBIC YARDS)
February 18, 1965	November 24, 1965	4,147,166
December 18, 1966	May 25, 1968	3,554,498
December 28, 1970	March 14, 1971	1,910,021
November 29, 1971	March 19, 1972	3,150,027
December 11, 1972	March 4, 1973	1,892,841
October 1, 1973	April 24, 1974	938,927
May 3, 1974	May 20, 1974	247,746
August 8, 1974	May 13, 1975	1,702,292
August 24, 1975	July 8, 1976	1,293,203
October 28, 1976	March 25, 1977	1,686,819
March 21, 1978	July 9, 1978	1,730,943
March 12, 1979	September 7, 1979	3,812,190
May 20, 1980	August 5, 1980	1,578,878
March 5, 1984	July 25, 1984	4,487,405
May 18, 1986	July 31, 1986	2,212,568
July 12, 19 88	October 4, 1988	1,038,946
September 26, 1989	September 30, 1989	58,938
August 9, 1990	December 5, 1990	3,429,223
April 23, 1993	August 25, 1993	2,892,622
January 5, 1995	February 3, 1995	971,797
July 30, 1995	September 21, 1995	261,221
February 9, 1996	March 1, 1996	8,653
December 6, 1996	March 31, 1997	2,525,532
April 15, 2003	June 25, 2003	2,115,504
July 22, 2006	September 24, 2006	3,744,550
Total		51,392,510
Average		2,055,700

The material is dredged from the Galveston Harbor and Channel: Inner Bar Channel, Outer Bar Channel, Entrance Channel, and Anchorage Area, and transported to the ODMDS by hopper

dredge or scow. The dredge, either a conventional bottom opening hopper or a split-hulled hopper, travels from the dredging site with its doors closed. Upon reaching the designated ODMDS, the hoppers are opened and the material is released as the dredge travels through the site. The hoppers are closed before the dredge leaves the site. The disposal operations occur 24 hours a day, seven days a week until the dredging is completed. Historically, dredged material release points were not specified; however, a 500-foot wide no-discharge zone immediately inside the boundaries of the ODMDS was observed to prevent short-term transport of the material out of the sites.

VI. Quantity of Material and Level of Contamination

A. Summary of information used to determine size of the site. Historically, the dredging frequency for this navigation project is approximately 1.5 years, with an average of about 2,055,700 cubic yards (CY) of material excavated per dredging contract. Overall grain size characteristic of the sediment are indicated by the D_{50} , which represents the median particle size. The channel sediment can be characterized as very fine sand, the ODMDS is fine sand while the reference area is very fine silt. Average particle size distribution is described in the table below.

LOCATION	AVERAGE COMPOSITION (%)			D_{50} (mm)
	SAND	SILT	CLAY	
Channel	43.9	32.6	23.6	0.112
ODMDS	70.0	20.4	9.6	0.133
Reference Area	16.1	32.5	51.3	0.006

As described in the site designation EIS, the existing interim-designated ODMDS was evaluated as an alternative for final designation, as were other mid-shelf and deepwater areas. Although no specific analyses were conducted to determine optimal size for the placement area, the existing site was determined to be the preferred alternative for final designation. Primary considerations for selecting this site were as follows:

1. The vicinity of the Interim Site has received material dredged from the Galveston Bay Channel System since at least 1931. Past studies have not determined any significant adverse impacts from disposal at the site.
2. Past studies have determined that this is a high-energy erosional zone and can generally accept large volumes of dredged material with little apparent net change to the bottom.

3. The site is within the inlet zone and are adjacent to the channel, providing easy access for dredged material placement operations, and reduce costs.
4. Studies have shown that there are no unique fisheries in the area

The irregular shape of the area is a result of its location. The northeast boundary roughly corresponds with the limit of the traffic lane safety fairway. Similarly, the northwest boundary approximates the shoreward limit of the fairway anchorage.

B. Summary of testing requirements per Regional Implementation Agreement (RIA) and summary of past dredged material evaluations. On September 24, 1992, a RIA (U.S. EPA and USACE, 2003) was executed between EPA Region 6, and the Galveston District. This RIA described protocols for evaluating the quality of the dredged material and implementation of the “GREEN BOOK” (U.S. EPA and USACE, 1991). These protocols describe chemical parameters to be analyzed, as well as required detection limits. It also specifies how toxicity testing and bioaccumulation assessments are to be conducted, as well as organisms to be utilized. Since that time, all sediment evaluations have been conducted in accordance with the RIA. Since the mid-1970s, before development of the RIA, dredged material from the Galveston Harbor and Channel Project had been evaluated numerous times to determine suitability for offshore placement. This testing was performed to determine levels of metals and organic constituents, as well as toxicity and bioaccumulation assessments. Testing performed for this project is summarized in the following table:

DATE	TYPE OF TESTING
August 21, 1975	Pre-dredging Bulk Analyses
August 25, 1975 - September 20, 1975	During-dredging Bulk Analyses
October 7, 1975	Post-dredging Bulk Analyses
February 17, 1976	Pre-dredging Bulk Analyses
March 1, 1976	During-dredging Bulk Analyses
March 31, 1976	Post-dredging Bulk Analyses
May 1978	Toxicity and Bioaccumulation Assessment
August 1978	Toxicity and Bioaccumulation Assessment
December 1979	Toxicity and Bioaccumulation Assessment
November 16, 1983	Pre-dredging Bulk Analyses
October 1984	Toxicity and Bioaccumulation Assessment
February 25, 1986	Pre-dredging Bulk Analyses

DATE	TYPE OF TESTING
April 14, 1988	Pre-dredging Bulk Analyses
June 8, 1990	Pre-dredging Bulk Analyses
September, October 1994	Toxicity and Bioaccumulation Assessment
September 11, 1996	Pre-dredging Bulk Analyses
March 17, 2004	Pre-dredging Bulk Analyses
March 2007	Toxicity and Bioaccumulation Assessment

The above testing indicated that the material was suitable for offshore placement without special management conditions.

VII. Anticipated Site Use

As previously discussed, the dredging frequency for this project is about 1.5 years, with an average of approximately 2,055,700 CY of material excavated per dredging contract. It is anticipated that the channel will continue to shoal at a similar rate. Presently, the ODMDS only receives dredged material from the Federally-maintained Galveston Harbor and Channel Project. Material from other sources is not presently placed at this site, and none is expected in the foreseeable future.

It is the policy of the Galveston District to implement beneficial uses of dredged material, wherever practicable. Beneficial use of material dredged from the Inner Bar Channel was employed during past maintenance operations. In 1993, approximately 694,800 CY of material was placed into a nearshore berm located about 1.0 nautical mile seaward of the Galveston Seawall. This placement option will be considered for future maintenance of the Galveston Harbor and Channel Project.

VIII. Special Management Conditions or Practices

Currently, no special management conditions or practices related to placement of dredged material into the designated ODMDS have been required. As previously discussed, evaluations of sediment quality have indicated that the material from the channel is suitable for offshore placement without such requirements. However, all operations shall be conducted such that the dredged material remains within the bounds of the ODMDS immediately following descent to the ocean floor.

A seasonal restriction has been recommended by the National Marine Fisheries Service, during formal consultation undertaken pursuant to the Endangered Species Act (NMFS, 2007). This restriction was based on potential impacts of hopper dredging operations on several species of threatened and endangered sea turtles. The recommendation is to restrict hopper dredging to the period from December 1 through March 31, during which turtle abundance is at a minimum. This recommendation pertains, however, only to actual dredging operations, and not placement of the material into the ODMDS. While it may not be practical to observe this restriction for all dredging cycles, it will be practiced when feasible.

IX Monitoring Program

The primary purpose of the Site Monitoring Program is to evaluate the impact of the placement of dredged material on the marine environment. The evaluations will be used for making decisions, preventing unacceptable adverse effects beyond the site boundary, and ensuring regulatory compliance over the life of the ODMDS. Emphasis will be placed on determining physical impacts, since, to date, dredged material from the Galveston Harbor and Channel Project has been determined to be acceptable for ocean placement, without special conditions; however, consideration of contaminants will also be included. Testing of dredged material is conducted based on “Greenbook” and RIA procedures, however it is necessary to verify the decisions made regarding the suitability of the dredged material are correct and that the material is not having an adverse impact to the environment. In the event that the material persists in the ODMDS, there may be potential for long-term contaminant effects on the benthos.

The size and location of the Galveston Harbor and Channel Project ODMDS were determined pursuant to the General Criteria as listed in 40 CFR 228.5, and the Specific Criteria at 40 CFR 228.6(a). There are no significant environmental resources delineated within or immediately outside of the designated ODMDS. Since this site is dispersive in nature, the primary concern of the use of the site is the potential short-term build up of dredged material, such that a hazard to navigation is presented. Another concern is whether there is significant short-term movement of the dredged material beyond the ODMDS boundaries, specifically the benthic community can be impacted if significant rapid movement of material off the sites occurs, resulting in burial of benthic populations outside the site. Studies have shown that benthic organisms can burrow through 6–9 inches of dredged material without significant impacts on the community (EPA/USACE, 1996).

The Site Monitoring Program is designed as a tiered program. If initial tier results fail predetermined limits, then a more complex set of tests is invoked at the next tier to determine the extent of impact. The tiers are used to facilitate rapid, accurate and economical collection of

information for use by the EPA, Region 6, and the USACE-SWG. The tiered testing for these factors is described below.

MAINTENANCE MATERIAL

TIER M1

Physical and chemical evaluations of the ODMDS material shall be conducted to characterize possible effects from the placement of dredged material occurring at the site. Physical analyses of the sediment can assist in assessing the impact of disposal practices on the benthic environment at the disposal site and determine if dredged material is migrating offsite. Chemical analyses of the sediment shall be conducted to establish whether contaminants of concern are suspected to be affecting the benthic environment at the disposal site.

Bathymetric Surveys

The ODMDSs are located outside of the safety fairway for large vessel traffic, therefore, the mounding will be considered in regard to shallow-draft vessels, only. Considering the grain-size characteristics of typical maintenance dredged material from this channel, significant mounding is not expected subsequent to discharge operations. The threshold elevation for mounding of dredged material within the ODMDS will be ten (10) feet above the existing bottom elevation.

Since the sites are dispersive, movement of material from the sites is expected to occur after disposal operations cease. In order to detect if short-term movement of the material out of the designated ODMDS is occurring at a significant rate, hydrographic surveys of the ODMDS shall be obtained before the start of disposal operations, and soon after completion of disposal operations. An accumulation of one (1) foot of sedimentation along the ODMDS boundary will be considered the threshold level for movement of material outside of the designated ODMDS. This determination shall be based on a comparison of the results of these before and after surveys.

Hydrographic surveys shall be conducted along transects within the ODMDS. These transects shall be oriented perpendicular to the channel in the direction of sediment transport (i.e., southwest). Transect intervals shall be every 1,000 feet extending 1,000 feet outside each boundary. In addition, a depth profile shall be obtained along the boundary.

Surveys shall be obtained using a USACE, or contract survey vessel equipped with electronic surveying capabilities. The vessel must be equipped with positioning equipment with a horizontal precision of one (1) foot. The fathometer, which shall display real-time depth on real-time location,

must have a precision of 0.5 feet. All data shall be collected using methodology described in Engineer Manual EM 1110-2-1003, dated January 1, 2002.

Data Analysis

- ◆ If deposited dredged material is not mounding to elevations greater than the threshold elevation above the existing bottom elevation, and there is no short-term movement of material beyond the limits of the ODMDS, then the management objectives are met. No further post-disposal monitoring will be required.
- ◆ If mounding to elevations greater than the threshold elevation, and/or movement of material out of the ODMDS has occurred, as determined by the post-dredging survey, then the monitoring program shall proceed to Tier M2.

Sediment Chemistry

Sediment chemistry analyses shall be conducted in conjunction with the dredged material evaluations from samples collected in the navigation channel. Collecting samples from both the navigation channel and ODMDS during the same sampling event has been determined to be the most efficient use of resources. Because most ODMDSs lie directly adjacent to the navigation channels, there are relatively short distances between the two areas. As described in the RIA, sediment testing in the navigation channels generally occurs on a five-year cycle. Sediment chemistry results from the ODMDSs should be compared to the results collected from the navigation channel. Significantly elevated sediment concentrations are defined as concentrations above the range of contaminant levels in dredged sediments that the Regional Administrator and the District Engineer found to be suitable for disposal at the ODMDS.

Data Analysis

- ◆ If contaminant concentrations are not significantly different than navigation channel concentrations then no further testing is needed.
- ◆ If significant increases in levels of contaminants are observed at the ODMDS, then a bioassay/bioaccumulation study shall be conducted to determine effects to the benthic community. The studies are described below as Biological Testing under Tier M2.

TIER M2

Bathymetric Surveys

If transport of material from the sites is occurring, hydrographic surveys shall be expanded to include the impacted areas and shall be performed on a semi-annual basis to determine the changes in dispersion of the material until the impacts are no longer observed. An accumulation of more than one (1) foot of sedimentation along the ODMDS boundary will be considered the threshold level for significant movement of material outside of the designated ODMDS.

Data Analysis

- ◆ If deposited dredged material is mounding to elevations above the threshold value, but less than fifteen (15) feet above the existing bottom elevation and there is no significant short-term transport of material beyond the limits of the ODMDS, then semi-annual post-disposal monitoring shall occur as described.
- ◆ If at six months after disposal, deposited dredged material remains mounded to elevations greater than half the post-disposal elevations, then bathymetric surveys shall be continued.
- ◆ If deposited dredged material is mounding to elevations greater than fifteen (15) feet, and/or significant movement of material out of the ODMDS has occurred, the Galveston District together with EPA Region 6 will consider various management options to rectify the situation. Such options could include, but are not limited to expansion of the ODMDS; or relocation of the ODMDS within the zone of siting feasibility described in the designation EIS.

Biological Testing

If the results of the Tier M1 sediment chemistry evaluation indicate the need for additional testing, then solid-phase bioassay and bioaccumulation testing shall be conducted in accordance with the procedures described in the RIA. Funding for work under this Tier shall be provided by EPA, Region 6 as described in Section IV, Funding.

Data Analysis

- ◆ If toxicity is not indicated, then no further testing is needed and disposal activities can continue at the ODMDS.
- ◆ If toxicity is indicated at the ODMDS, the Galveston District together with EPA Region 6 will consider various management options to rectify the situation. Because the ODMDS is a dispersive site, potential sources of toxicity other than dredged material must also be considered. If planned use of the ODMDS is imminent, a decision must also be made whether to allow continued use of this site.

X. Site Management Plan Review and Revision

Pursuant to Section 102(c) of the MPRSA, as amended by WRDA 1992, the site management plan for the Galveston Harbor and Channel ODMDS will be reviewed and revised, if necessary, not less frequently than 10 years after adoption and every 10 years, thereafter.

Modifications or updates to the site management plan may be necessary, based on specific needs identified for specific authorized projects. Modifications or updates to the site management plan may be proposed by either the USACE-SWG or EPA Region 6. Following a thirty (30) day review period of the changes(s), the modifications may be incorporated into the plan by mutual consent of both agencies.

This Site Management Plan complies with Section 102(c)(3) of the Marine Protection, Research and Sanctuaries Act of 1972 (33 U.S.C. Sections 1401, et seq.) as amended by Section 506 of the Water Resources Development Act of 1992 (WRDA 92; Public Law 102-580), and has been approved by the following officials of Region 6 of the U.S. Environmental Protection Agency, and Galveston District of the U.S. Army Corps of Engineers. This plan goes into effect upon the date of the last signature:

Richard Greene
Regional Administrator
Region 6
U.S. Environmental Protection Agency

Date

David C. Weston
Colonel, Corps of Engineers
District Engineer
Galveston District
U.S. Army Corps of Engineers

Date

XI. References

- NMFS (National Marine Fisheries Service), 2007. Revision 2 to the November 19, 2003 Biological Opinion concerning Dredging of Gulf of Mexico Navigation Channels and Sand Mining ("Borrow") Areas Using Hopper Dredges by COE Galveston, New Orleans, Mobile, and Jacksonville Districts (Consultation Number F/SER/2000/01287).
- U.S. EPA and USACE. 1991. *Evaluation of Dredged Material Proposed for Ocean Disposal - Testing Manual*. EPA-503/8-91/001. U.S. Environmental Protection Agency and U.S. Army Corps of Engineers, Washington, D.C.
- U.S. EPA and USACE. 2003. *Regional Implementation Agreement for Testing and Reporting Requirements for Ocean Disposal of Dredged Material off the Louisiana and Texas Coasts Under Section 103 of The Marine Protection, Research and Sanctuaries Act*. U.S. Environmental Protection Agency, Region 6 and U.S. Army Corps of Engineers, Galveston and New Orleans Districts.

